

## Occult pneumomediastinum after blunt chest trauma: worrisome finding yet good clinical outcome

Occult pneumomediastinum after blunt trauma

Topel Çağdaş  
Department of Radiology, Ağrı State Hospital, Ağrı, Turkey

### Abstract

Occult pneumomediastinum refers to the presence of mediastinal air when there was no evidence of it on a chest X-ray. It is of importance to exclude aerodigestive tract injuries in order to avoid unnecessary endoscopic or surgical procedures. Multi-detector computed tomography is the first-line non-invasive imaging method which is readily available for the diagnosis and exclusion of possible aerodigestive tract injuries. Moreover, the administration of oral contrast, which can be easily tolerated by patients, may augment the diagnostic efficiency. We present a young patient with occult pneumomediastinum after blunt chest trauma who presented with chiefly esophageal symptoms suggestive of esophageal perforation. CT findings and management are discussed.

### Keywords

Occult Pneumomediastinum; Computed Tomography; Oral Contrast; Aerodigestive Tract Injury

DOI: 10.4328/ACAM.6213 Received: 20.02.2019 Accepted: 17.03.2019 Published Online: 22.03.2019 Printed: 01.05.2020 Ann Clin Anal Med 2020;11(3):242-245-247  
Corresponding Author: Çağdaş Topel, Department of Radiology, Ağrı State Hospital, Ağrı, Turkey.  
GSM: +905438309044 E-Mail: cgdstpl@gmail.com  
ORCID ID: <https://orcid.org/0000-0001-8312-6896>

## Introduction

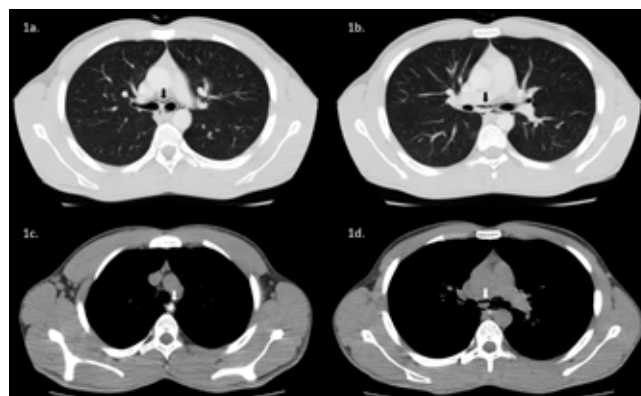
Pneumomediastinum after penetrating trauma is often associated with either an aerodigestive or a thoracic injury which warrants immediate surgical intervention [1]. However, the presentation of pneumomediastinum after blunt trauma is rare and the management less clear. Because of its low incidence, the diagnosis can be easily missed. Although esophageal injuries are rare manifesting in <0.1% to 1.5% of patients with blunt chest trauma, mortality rate as 19% has been reported in those cases [2]. Radiologic evaluation is important for the diagnosis and management at this prospect. In this regard, multidetector computed tomography (MDCT) plays a key role in the setting of thoracic blunt trauma [3]. However, its controversial utility and benefits in trauma patients, oral contrast administration in proper patients can aid in diagnosis by narrowing the differentials in terms of esophageal perforation. In this case report, we present a patient with occult pneumomediastinum after falling down on the road in whom water-soluble oral contrast administration ruled out esophageal perforation thus eliminated the need for additional examinations.

## Case Report

A 24-year-old man admitted to the emergency department with the complaint of difficulty in swallowing. His symptoms began after the patient slipped and fell on an icy road and landed on his chest three hours before the presentation. He had no past history of medical record. Written consent for the publication from the patient was obtained.

On physical exam, heart rate was 85bpm, blood pressure 110/70mmHg, respiratory rate 18 breaths per minute, and temperature 37.3°C. Oxygen saturation of 99% on room air was detected by pulse oximetry. A slight tenderness on the sternum was present on palpation. No crepitus in the chest and neck area which indicated subcutaneous emphysema were observed. The auscultation of the lungs was clear. Heart sounds were regular with normal S1 and S2. No murmurs or extra sounds were detected. The abdominal exam was unremarkable.

Routine laboratory exams were of no significance. Normal sinus rhythm and no evidence of myocardial ischemia were seen on the electrocardiogram. Then, a chest X-ray was ordered in which no significant gas outlining mediastinal structures, pneumothorax or subcutaneous emphysema was detected. The lung parenchyma fields were normal. Chest CT with intravenous contrast which is performed due to the persistence of his symptoms revealed free mediastinal air consistent with the diagnosis of a pneumomediastinum (Figure 1a-b) without any other findings especially any emphysema or bullae. As the chief complain of the patient was difficulty in swallowing which was regarded as an esophageal symptom, consultant radiologist suggested a second scan with oral water-soluble contrast to rule out esophageal perforation. As there was no discernable oral contrast extravasation into the mediastinum (Figure 1c-d), further examination with esophagoscopy was dismissed and the patient was followed up. Bronchoscopy was also opted out as there was no discernible disruption of the tracheobronchial tree. The patient was managed as an inpatient conservatively with analgesia (acetaminophen), prophylactic antibiotics for 7 days (first piperacillin-tazobactam intravenously in case of mediastinitis, followed by amoxicillin-clavulanate orally) and anti-constipation therapy in order to prevent any positive pressure. He was taught to avoid maneuvers that increased chest pressure (forced expiration or Valsalva maneuver). The pneumo-



**Figure 1.** Chest CT of lung window shows air outlining mediastinal structures at the level of main bronchi (black arrow in 1a-b). An image of mediastinal window denotes luminal oral contrast in the thoracic esophagus (white arrow in 1c). A demonstrative image showing no contrast extravasation into the mediastinum (1d). The arrow in figure 1d indicates the mediastinal air which is free of contrast.

mediastinum resolved completely on 48-hour control chest CT and the patient was discharged after symptomatic resolution without any complications by the 7th day of his admission.

## Discussion

The thoracic injury which can be caused either by blunt or penetrating trauma is associated with considerable morbidity and mortality due to the relation with the injuries of the tracheobronchial tree, esophagus or vascular structures. Approximately 25% of blunt traumatic casualties are a direct result of thoracic injury [1]. In a study that evaluated blunt trauma patients with CT scans and the rate of occult pneumomediastinum was found to be 6% which implies that it is not a rare occurrence [2]. In patients with pneumomediastinum, blunt trauma is the mostly faced injury mechanism and may co-occur with severe blunt thoracic and cervical trauma up to 10% of patients. High-speed motor vehicle accidents account for the major reason for blunt trauma in those patients [1]. The Macklin effect is the most common cause of pneumomediastinum in the setting of blunt trauma. It is the outcome of rupture of terminal alveoli afflicted by increased intrathoracic pressure and consequent dissection of air through peribronchial and perivascular fascial sheaths, finally into the mediastinum [4]. In patients with blunt trauma, pneumomediastinum is regarded as an ominous finding because it can arise from anatomical sources such as head and neck, submandibular space, retropharyngeal space, and even retroperitoneal space or pelvis. It may not originate automatically and not necessarily in the intra-thoracic aerodigestive tract. Traumatic pneumomediastinum is sourced by tracheobronchial or esophageal tears in up to 10% of patients [5]. Although esophageal injuries are rare manifesting in <0.1% to 1.5% of patients, mortality rate as 19% has been reported in those cases [2]. At this point, it is of utmost importance to evaluate patients for possible esophageal injuries to prompt surgical intervention.

In the presence of pneumomediastinum, aerodigestive tract injury must be ruled out which may result in a fatality. Historically, this required definitive identification of injuries with esophagogram, esophagogastroduodenoscopy, and bronchoscopy [6]. These procedures for evaluation can be poorly tolerated to some extent, and although the risks of iatrogenic injury are low, they are not zero. Accessibility to endoscopic techniques, patient preparation, and sedoanalgesia may be challenging. In our patient, bronchoscopy was opted out as there was no discernible disruption of the tracheobronchial tree. The consultant

gastroenterologist favored esophagoscopy in the first place to rule out esophageal perforation. After no water-soluble iodine contrast extravasation into mediastinum was demonstrated, this choice was also opted out and the patient was managed conservatively without any complications. The pneumomediastinum resolved completely on 48-hour control chest CT and the patient was discharged after symptomatic resolution. It is reported that occult pneumomediastinum resolved in average 3 hours after the initial exam [2].

CT exams are more sensitive to detect free mediastinal air than chest X-ray and the expanding use of CT scan for first assessment plays a role not only in diagnosing mediastinal air but also in the management of trauma patients, in particular, those with blunt chest trauma [3,6]. Another feature expected from CT is the ability to detect possible esophageal injuries with high sensitivity. Oral contrast media administration can enhance its ability to rule out such injuries. There are plenty of studies concerning the oral contrast administration in blunt trauma patients mostly in abdominopelvic injuries. The majority of studies conclude that CT without oral contrast material is adequate for depiction intraabdominal injuries that required surgical repair thus obviate its administration [7, 8]. However, these studies were related to abdominal trauma and to the extent of our knowledge, utilization of oral contrast in thoracic trauma patients has not been investigated. Although we excluded esophageal perforation by using water-soluble oral contrast medium in our patient, the lack of solid studies concerning contrast media administration in this patient group prevents us to make any concrete recommendation.

### Conclusion

Occult pneumomediastinum in the setting of blunt trauma is a rare occurrence where any presence of aerodigestive tract injury warrants surgical intervention. In patients highly suggestive of such injuries, esophagoscopy or bronchoscopy have the major role for excluding aerodigestive perforation, while a thorough CT scan can obviate these strenuous examinations. The efficacy of CT scan in ruling out a significant digestive tract injury may be enhanced by oral contrast administration in the targeted patients yet further studies with large patient groups are warranted to draw solid conclusions.

### Scientific Responsibility Statement

*The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.*

### Animal and human rights statement

*All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.*

### Conflict of interest

*None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.*

### References

1. Karmy-Jones R, Jurkovich GJ. Blunt chest trauma. *Curr Prob Surg.* 2004;41(3):223-380.
2. Rezende-Neto J, Hoffmann J, Al Mahroos M, Tien H, Hsee L, Netto FS, et al. Occult pneumomediastinum in blunt chest trauma: clinical significance. *Injury.* 2010;41(1):40-3.
3. Ergin M, Ergin İ, Dural K, Yeginsu A, Sayın B, Sakıncı Ü, et al. Use of Chest Computed Tomography in Stable Patients with Blunt Thoracic Trauma: Clinical and Forensic Perspective. *J Clin Anal Med.* 2011;2(31):9-12.
4. Cyrlak D, Milne E, Imray T. Pneumomediastinum: a diagnostic problem. *Crit Rev Diagn Imaging.* 1984;23(1):75-117.
5. Dissanaik S, Shalhub S, Jurkovich GJ. The evaluation of pneumomediastinum in

blunt trauma patients. *J Trauma Acute Care Surg.* 2008;65(6):1340-5.

6. Traub M, Stevenson M, McEvoy S, Briggs G, Lo SK, Leibman S, et al. The use of chest computed tomography versus chest X-ray in patients with major blunt trauma. *Injury.* 2007;38(1):43.

7. Stuhlfaut JW, Soto JA, Lucey BC, Ulrich A, Rathlev NK, Burke PA, et al. Blunt abdominal trauma: performance of CT without oral contrast material. *Radiology.* 2004;233(3):689-94.

8. Huynh LN, Coughlin BF, Wolfe J, Blank F, Lee SY, Smithline HA. Patient encounter time intervals in the evaluation of emergency department patients requiring abdominopelvic CT: oral contrast versus no contrast. *Emerg Radiol.* 2004;10(6):310-3.

### How to cite this article:

Çağdaş T. Occult pneumomediastinum after blunt chest trauma: worrisome finding yet good clinical outcome. *Ann Clin Anal Med* 2020;11(3):242-245-247